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Guide to the Use of the Cement and Concrete Research Remote Bulletin Board System (RBBS) Computer



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Department of Commerce
Institute of Standards and Technology
Building Technology
Gaithersburg, MD 20899

Guide to the Use of the Cement and Concrete Research Remote Bulletin Board System (RBBS) Computer

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ABSTRACT

A computer system has been installed at the National Institute of Standards and Technology, Building Materials Division, for exchanging and disseminating information related to cement and concrete research. The computer is accessible, remotely, through telephone lines. Messages, and computer stored files in many formats can be exchanged among cement researchers. Also, information can be retrieved and/or viewed that describes: scheduled symposia, archived computer based models, project summaries, and published papers. This document describes how to use the computer system.

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1. INTRODUCTION

This document describes the capabilities and operating procedures for a Remote Bulletin Board System (RBBS) computer which is currently available at the National Institute of Standards and Technology (NIST) in Gaithersburg, MD. The RBBS was established to satisfy the need to maintain, at a central location, information relating to the activities of cement and concrete research. This computerized system is a powerful tool for exchanging and disseminating information. Throughout this document, the activities of the Center for Advanced Cement-Based Materials (ACBM) will be used to exemplify the types of information and methods used for information exchange. The scope of the RBBS includes all research on cement and concrete being performed at NIST, Center for Building Technology, Building Materials Division.

The concept of a bulletin board computer is quite simple, and can provide a low cost, easy to use facility for information exchange. Previous experience in using bulletin board computers at NIST has revealed their strengths and weaknesses. These include:

Strengths

- o the cost of maintaining the computer system is low
- o the computer system is easy to learn and use
- o the computer system provides a focused environment for information exchange

Weaknesses

- o cost may be high to user
- o use is restricted to computer telephone access
- o transmission of information may be slow compared to networks
- o quality of data transmission may be less, compared to networks

During the mid 1980's, a bulletin board computer was established at NIST for the purpose of obtaining feedback from expert systems work in the Building Materials Division [1]. This computer was used to communicate information between experts, users, and developers involved in the DURCON project. Since that time, improvements have been made to increase the speed, add more disk capacity, and upgrade the bulletin board software with additional functions. The new RBBS is used to transfer messages and files between researchers, and to provide information on selected topics. Other computerized systems exist for information exchange (e.g. networks and host computers), but the fundamental difference between the NIST bulletin board computer and other computers is the bulletin board computer serves as a focal point (information depository) for information. Its use is specific to information exchange (e.g. messages, files, database information) on cement and concrete. The facility operates on a desktop personal computer. It supports incoming telephone calls from remote users through the use of a modem device attached to the users workstation. The computer program that provides the user interface is the most widely used on bulletin board computers today. Sections 3 and 4 of this document describe its capabilities and use.

The NIST RBBS is the only known computer operating at this time that allows researchers to exchange and query information about cement and concrete research. Other communications methods such as BITNET and NSFNET are used to communicate messages and files between researchers, but they do not allow the user to connect to one central location to query for scheduled seminars, project summaries, existing archived models, or publications on cement and concrete. The RBBS computer provides a relatively low cost yet efficient resource for maintaining this information. The RBBS uses a menu driven system which makes it extremely easy to learn and use. The features available in the RBBS system are:

- o electronic mail facilities
- o file transfer facilities
- o cement and concrete research activities database
- o computer conferencing

Another important aspect of the NIST RBBS is that personnel (identified below) are available to consult with users on methods relating to information transfer, and aid in resolving problems. Inquiries about the system should be directed to:

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2. Information Exchange

Information related to cement and concrete research is stored in the computer in many different forms. It tends to be in one of the following formats:

- o messages
- o documents (e.g. letters, technical papers)
- o computer graphics (drawings, photographs, graphs)
- o computer images (digitized pictures)
- o databases

The format varies for each of the different types and can present problems when the information needs to be communicated electronically. These problems include: the ability to interpret graphics, special formatting codes within documents, and information stored in the format of a particular database management system. The RBBS eliminates these problems by allowing users to communicate any type of document. Of course, the sender and receiver must have compatible programs to manipulate the information, such as the same word processing program or one that converts from one format to another. But the electronic linkage is provided which allows information to be communicated. Since the processing of different information types extends beyond the scope of this document, only the communication of messages, files (which contain all types identified above), and the display of database information will be described in the remainder of this section.

2.1 Electronic Mail Messages

Electronic mail is the simplest form of information exchange. It can represent information as a point of fact or a query to another user. Messages may contain information about ideas, express an opinion, request an action or response from the receiver, or may indicate that an action has been taken by the sender. Appendix A.1 contains an electronic mail message example.

2.2 Files

Files may contain any information stored on the user's workstation. These may be in any format. Communicating a file using the RBBS requires some notification that it has been sent. Usually this is accomplished by sending a message to the receiver indicating that a file has been stored in the RBBS computer. The user designated to receive the file must then call the RBBS and transfer the file to his individual workstation. Users must always specify the format of the file in the message. This will eliminate problems when the file is processed on the receiver's workstation. Appendix A.2 contains an example of a file containing a document.

2.3 Cement and Concrete Research Activities Database

The purpose of the Cement and Concrete Research Activities Database is to provide researchers with information about related activities. There are currently four topics covered by the database:

- o schedule of seminars and symposia at NIST
- o archived models and algorithms in the Modeling Laboratory
- o project summaries related to cement and concrete publications
- o selected cement and concrete

Access to this information is provided through commercial telephone lines that connect to the RBBS computer at NIST. Sections 3 and 4 of this document describe how to access and use the computer. Information included in the database is maintained by the NIST staff. The remainder of this section describes the database information and format.

2.3.1 Seminars and Symposia Information

The seminars and symposia topic provides information on scheduled meetings of interest to cement and concrete researchers. An example of the information included in this topic is illustrated in Figure 1. Appendix A.3 describes the format of the information.

*** Scheduled Seminars, Workshops and Symposia ****	
Speaker	Dr. Edward Garboczi, NIST
Topic	"Mathematical Modeling Workshop"
Date	July 30-August 3, 1990
Location	NIST, Gaithersburg, MD 20899
Sponsor	ACBM/NIST
	Contact Dr. E. Garboczi (301) 975-6708

Figure 1 Example of Scheduled Seminars, Workshop and Symposia information

2.3.2 Archived Models and Algorithms

Information describing currently archived models and algorithms helps to identify what computer code is available from the NIST. An abstract summarizes the capabilities of the computer software. Currently there are five archived computer programs cataloged under this topic. An

example of the information included in this topic is shown in Figure 2. Appendix A.4 describes the format of the information.

July 17, 1989

*** Cementitious Modeling Laboratory Models ***

MODEL NAME
DESCRIPTION

Cement Microstructure Model
A computer model to simulate the development of microstructure during the hydration of cement. The model is used to examine the effects of particle size distributions on packing of the particles and on microstructural development during cement hydration. The simulation demonstrates graphically the effects on microstructure of typical particle size distributions reported using an open-circuit ball mill and roller mill.

VERSION 8
REFERENCE/S

Proceed. of the Engineering Foundation Conference (1986),
CIB.86 Advancing Building Technology Proceedings (1986),
Journal of American Ceramic Society 69(11)790-795 (1986),
Matls. Res. Society Symposia Proceedings, 85 (1987),
Manual for Cement Hydration Simulation Model, NIST (1989),
8th Intl Congress on the Chemistry of Cement,
2 310-315(1986),
World Cement, 16(8) 326-333,
World Cement, 15(1),13-24,
Proceed. of Seminar on Hydration of Cement,
Copenhagen (1987),
Zement Kalk Gips 35(8), 425-431 (1982).

CONTACT/S

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(Univ. of Illinois).

Figure 2 Example of archived models and algorithms information.

2.3.3 Project Summaries Related to Cement and Concrete Research

This information describes current research projects being conducted at NIST. It includes work

related to ACBM activities, and other cement and concrete research. Information included in this topic is shown in Figure 3. Appendix A.5 describes the format of the information.

*** Project Summaries Database ***	
Project Name :	Computer Simulation of Transport Properties of Cementitious Materials
Research Area:	Service-Life Predictions
Description :	The diffusivity of cementitious materials is being determined through simulation modeling. First, the microstructure of cement paste is simulated, starting with digital images of cement particles and hydration product and applying growth rules that incorporate elements of randomness. Then the Fogelholm transport algorithm has been used to compute the diffusivity of the capillary pore space of the simulated microstructure. However, the Fogelholm algorithm cannot handle the complex connectivity of the gel pores. A conjugate gradient relation algorithm is being incorporated into the simulation model which should permit modeling of the diffusivity of liquids through both capillary and gels pores of cement paste.
Contact Person:	Dr. Edward Garboczi (301) 975-6708

Figure 3 Example of project summaries database information.

2.3.4 Selected Cement and Concrete Publications

This topic contains a list of published papers authored at NIST on cement and concrete research. Information included in this topic is shown in Figure 4. Appendix A.6 describes the format of the information.

National Institute of Standards and Technology
Center for Building Technology
Selected Cement and Concrete Publications

1. Philleo, R.E., Clifton, J.R., "Pore Structure of Concrete and Freezing Vulnerability of High-Performance Concrete", NIST Interagency Report 89-4186 (11/89).
2. Clifton, J.R., Knab, L.I., "Service Life of Concrete", NIST Interagency Report 89-4086 (06/89).

Figure 4 Database schema for selected cement and
concrete publications topic.

2.4 Communications Access Method

The commercial telephone system is used to allow the user with a computer or terminal and a modem to call the RBBS. Although this method is more expensive per call than local and wide-area networks, it is still widely used by computer users. The recommended equipment and connections needed to use the RBBS are outlined in Figure 5.

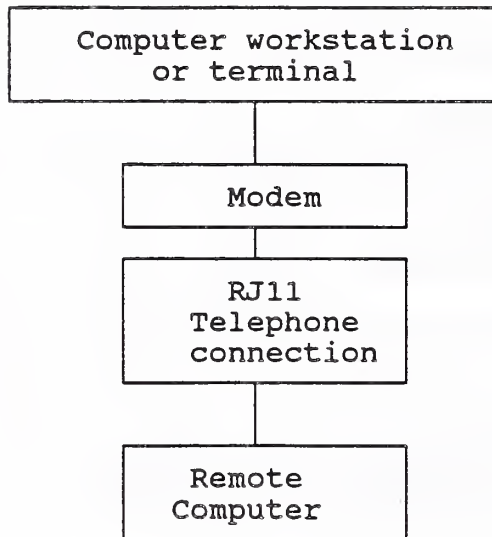


Figure 5 Computer connections using an external modem.

3. REMOTE BULLETIN BOARD COMPUTER SYSTEM DESCRIPTION

This section of the document describes the facilities of the RBBS. It will assist the user in understanding the capabilities of the system. In this section, the purpose, type of available information, and a brief description of the computer hardware and software are presented.

3.1 Facilities

RBBS facilities are grouped by function (e.g. FILES, UTILITIES). These functions are further sub-divided by procedure (e.g. Download, Upload). An understanding of these facilities and their relationships, is key to using the RBBS. Figure 6 identifies these facilities and their related procedures. Each procedure is described in detail in the remainder of this section. Activating each procedure is accomplished by calling the computer, logging on, and entering the required commands. Details on the use of these commands are provided in Section 4. Appendix B includes examples of their use.

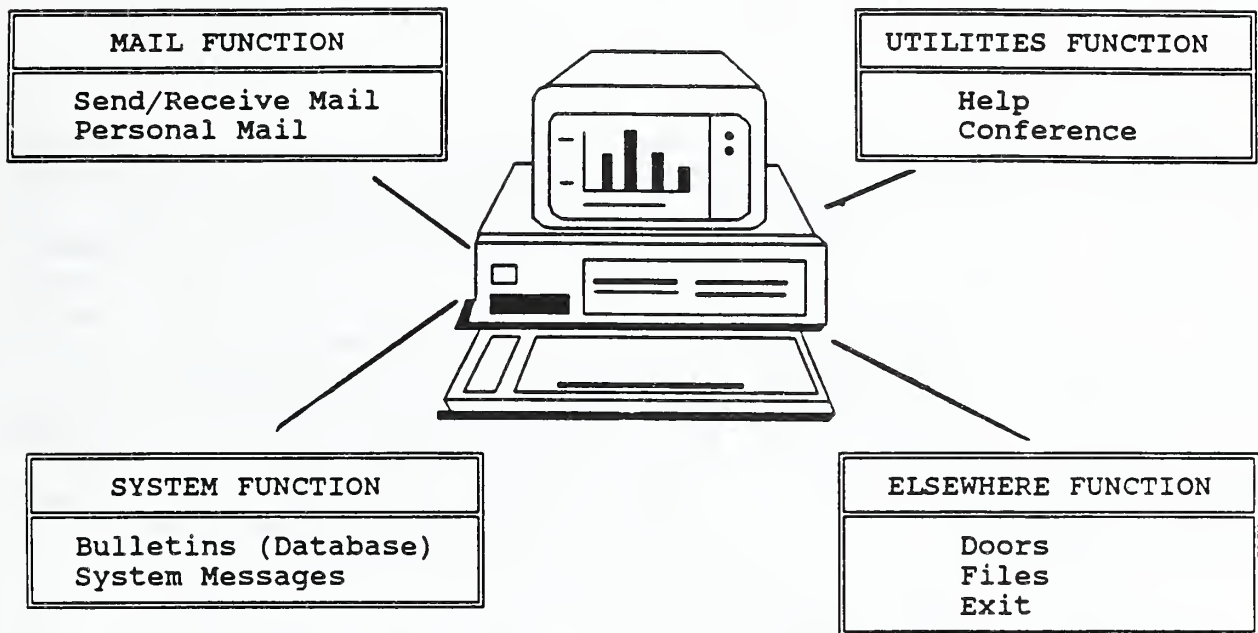


Figure 6 RBBS facilities and related procedures.

3.1.1 Communicating Messages

The MESSAGE facility provides an "electronic" link between RBBS users. Each RBBS user is identified by a name which is chosen when the user registers with the computer for the first time. Users may query the system using the UTILITIES facility to determine who is registered. Procedures included in the MESSAGE facility are:

- o Enter Message
- o Kill Message
- o Personal Mail
- o Read Message
- o Scan Message Header
- o Topic Message Scan
- o View Mail Wait

Enter, Kill, and Read message, and Personal Mail are the most commonly used of these procedures. Enter Message allows the user to type in a message to a user and place it in the user's mail box. When the user performs logon, a message indicating that he or she has mail will be displayed. Problems with the RBBS may be sent to the System Operator (SYSOP) using the

MESSAGE facility. The SYSOP is the administrator in charge of the RBBS operation. Section 3.3.1 describes the responsibilities of the SYSOP.

3.1.2 Communicating Files

One of the most unique features of the RBBS is its ability to communicate files of any format without the need for conversion. Often, computers require files to be converted to the ASCII representation; when this is done, special formatting contained in the document is lost. Another potential problem with transmitting files using networks is the automatic conversion that may take place between host computers or gateways. These problems are eliminated when using the RBBS computer. Files of any type may be transmitted, intact. They include; text files, graphics files, binary files, and images. Careful consideration should be given, however, to the amount of time needed to transmit the file. Since the procedure may involve long distance telephone calls, it may be costly if the caller uses the RBBS for long sessions. Also, the variability in the quality of data transmission may make file transmission less desirable. Resorting to the mailing of magnetic media or using a wide-area network may be more appropriate. Procedures that are provided for communicating files include:

- o Download (receive a file from the RBBS)
- o Upload (send a file to the RBBS)
- o List files (lists the catalogued RBBS files)
- o Personal Files
- o View ARC Files
- o Zippy Search

Upload, Download, and List files are the most commonly used of these procedures. When communicating files, the Kermit [2] file protocol is recommended. Since Kermit is used universally for terminal emulation and file transmission on dial-up computers, and it is public domain software, it provides a widely compatible and low-cost method. Kermit was first developed at Columbia University in New York, NY, and is currently available on well over 100 different computer types. For detailed information on how to configure file communications, refer to Section 4.3.

3.1.3 System Facility

The SYSTEM facility supports procedures to allow users to conduct conferences, run programs remotely, make comments to the SYSOP, and review information presented at logon. Of these, only the Bulletins (used to display the Cement and Concrete Research Activities Database), and Join a conference will be described in this section. The remaining procedures are self-explanatory and are described in the Help procedure under the UTILITIES facility.

3.1.3.1 Cement and Concrete Research Activities Database

Section 2.3 presented the information stored in the Research Activities Database. In this section, information about querying the database using the RBBS SYSTEM facility and its procedures

will be presented.

Querying or viewing the information contained in the Research Activities Database requires the use of the Bulletins procedure found in the SYSTEM menu of the RBBS. In the current stage of development, the term database implies that the information has been given a structure and can only be retrieved. The system does not support sophisticated query commands, sorting, or report generation for the manipulation of information. At this time, the procedure allows only the selection of the topic of information and the means of displaying it. As RBBS use grows, and the need is demonstrated, manipulative commands will be implemented.

3.1.3.2 Computer Conferencing

Establishing a "conference" on the RBBS can be an effective way to conduct an electronic meeting without leaving the office. Conferences can be open to all callers or can be restricted to specific callers. Guidelines for establishing a conference are:

- o Appoint a "conference" chairman to manage the conference. The chairman's job is to add new users, delete old ones, make sure that the subject and/or the agenda of the conference is adhered to by killing messages that are inappropriate. Also, the chairman should be able to assist users in interacting with the RBBS and maintain an active conference to ensure that all members are involved. This is best accomplished by having a separate user file for each "conference" in which the caller has chairman privileges only when in the specific "conference".
- o Establish an agenda or list of subject areas for the "conference". One of these should be about new subject areas. These areas should be VERY narrow in scope. The essence of any good conference is keeping it focused.

3.2 Bulletin Board Computer Hardware

A desktop personal computer is currently being used to operate the RBBS. This computer offers a very economical and reliable platform for the system. During 1990, the computer was upgraded to increase the disk capacity and speed of the central processing unit. This increased hardware capability is expected to satisfy the need of the system for a number of years. Communications for the system is achieved through a connection to the NIST PBX communications interface. Figure 7 illustrates the computer hardware configuration of the computer system. Only the SYSOP has access to the keyboard and display of the RBBS. Users are restricted to dial-in use only.

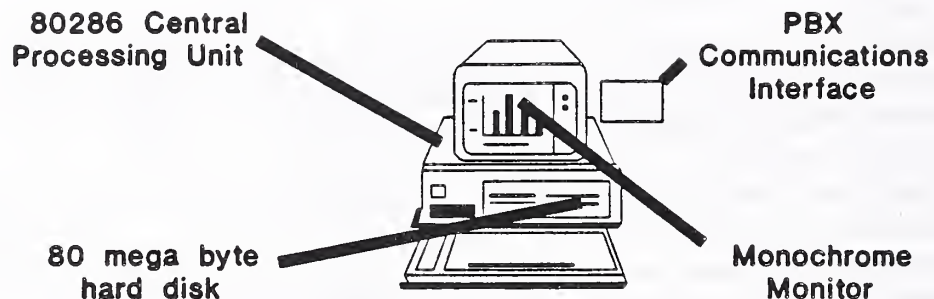


Figure 7 RBBS computer hardware configuration.

3.3 Bulletin Board Computer Software

The computer software used to manage the RBBS operations is a public domain software package named Remote Bulletin Board System-Personal Computer (RBBS-PC), version CPC17.2A [3]. The fact that it is public domain accounts for its wide use for bulletin board systems. A very powerful user community has formed since the software was first introduced. This group has been instrumental in its continued growth. Revisions to correct errors and provide expanded features are produced regularly.

3.3.1 Operating Environment and Staff Support

Management of RBBS-PC software requires a person to oversee its operation. This person is called the System Operator or SYSOP. The responsibilities of the SYSOP are:

- o install the computer hardware and software
- o establish system security levels

- o trouble-shoot problems identified by users
- o manage bulletin board information (e.g. bulletins, announcements)
- o provide security for data and equipment

This effort may take as little as one-half hour per week or several hours per week, depending on the volume of usage of the system. Staff requirements for the NIST RBBS are 2-4 hours per week. This is due to the need to keep the Research Activities Database current. Most of this effort is performed by an administrative person.

Since the user community for the RBBS is dispersed geographically, it is necessary to maintain a 24-hour operation, hence the need to provide a dedicated computer. Since the system requires little maintenance, downtime is kept at a minimum. This provides users with maximum access to the computer. However, only one caller can use the RBBS at a time. Support for multiple concurrent callers is currently disabled but could be added later.

There are limitations placed on the use of the system for each session. These include the amount of time allowed for each call, security level for services, and information to be displayed when logging on. Table 1 identifies these and other session parameters.

PARAMETER NAME	VALUE
Maximum time per session	60 minutes
Period of inactivity before removal	6 months
System operator office hours	08:00-17:00 hours
Remind users of messages they left	yes
Maximum number of lines per message	19
Show full menu of commands	yes
Availability of "doors" system	no
Security level for users	9
Allows users to change password	yes
Maximum length of description for file upload	40 characters

Table 1 Remote bulletin board system
caller parameters

4. REMOTE BULLETIN BOARD OPERATION

This section provides a quick reference for users of the RBBS. It describes the most common operations that callers are likely to use. It is hoped that this document, and the RBBS UTILITIES facility Help procedure will provide sufficient information on its use. A glossary is also provided as part of this document. It will assist users in the understanding of RBBS operations. In addition, a summary of the Kermit communications program commands is provided in Appendix D.

4.1 Remote Workstation Requirements

To begin using the RBBS, the caller must have a computer configured as shown in Figure 5. It is also possible to use a terminal (keyboard and display) device with the system, however, this restricts the caller to the exchange of messages and viewing of the Research Activities Database. In addition to equipment needs, there are workstation communications parameters that must be set before one can use the RBBS. These are identified in Table 2.

PARAMETER	VALUE
Baud rate	1200 bits per second
Communications port	COM1, COM2 or COM3
Parity	None
Stop bits	1
Local echo	Off
Handshake	None
Flow control	Xon/Xoff
Number of data bits	8

Table 2 Workstation communications parameters.

4.2 Establishing User Names and Logon

Connecting to the RBBS computer requires the user to call the RBBS telephone number and perform a logon. The NIST RBBS telephone number can be obtained by calling one of the key personnel identified in the Introduction Section of this document. Once the caller has the number and has configured the workstation communications parameters as described in Table 2, he can begin using the system. The user name and the session configuration is established when the caller registers with the RBBS during the first call. Appendix B.1 provides an example of an initial logon session. It is important to have the information in Table 3 ready when the first call to the RBBS computer is made. The password, display settings, and file transfer configuration can be changed, through the UTILITIES facility, during subsequent calls. When the caller successfully registers with the RBBS computer and when subsequent calls are made, the following information is displayed:

- o a welcome message
- o number of times on the system
- o whether there are any messages for the caller
- o mail messages left by the caller
- o the MAIN menu

PARAMETER	FORMAT
First name	1-12 characters
Last name	1-20 characters
Password	1-8 characters
City and State Abbreviation	1-30 characters

Table 3 Caller registration requirements

The MAIN menu is the control center for the RBBS. All facilities and procedures are selected from this display. Figure 8 illustrates this menu.

RBBS-PC MAIN MENU			
----- MAIL -----	SYSTEM -----	UTILITIES -----	ELSEWHERE --
[E]nter a Message	[A]nswer Questions	[H]elp (or ?)	[D]oors
[K]ill a Message	[B]ulletins	[J]oin Conferences	[F]iles
[P]ersonal Mail	[C]omment	[V]iew Conferences	[G]oodbye
[R]ead Messages	[I]nitial Welcome	[X]pert on/off	[Q]uit
[S]can Messages	[O]perator Page		[U]tilities
[T]opic of Msgs	[W]ho else is on	* = unavailable	[*]Library
MAIN command <?,A,B,C,D,E,F,H,I,K,O,P,Q,R,S,T,U,V,W,X>? r			

Figure 8 RBBS MAIN menu.

4.3 Selecting The User Operating Configuration

Selecting or changing user operating parameters is performed from the ELSEWHERE facility, Utilities procedure. From this menu, the caller can change the following parameters:

- o screen display settings
- o baud rate
- o file protocol
- o password

In addition to the above information, a list of users can be displayed. This is useful when it is necessary to send a message to another user and the sender does not know the exact format of the user's name. Figure 9 lists the options available in the Utilities procedure menu.

```

      RBBS-PC  U T I L I T I E S
-- DISPLAY ----- INFO ----- SYSTEM ----- ELSEWHERE -
[E]cho pref      [H]elp (or ?)  [B]aud Rate Change  [Q]uit
[G]raphics       [R]ead Profile [C]lock Time-Date
[L]ines/Page     [S]tatistics  [F]ile Protocol
[M]essage margin [U]ser log      [P]assword Change
* = unavailable          [T]oggles

UTIL command <?,B,C,E,F,G,H,L,M,P,Q,R,S,T,U,X>? u

```

Figure 9 RBBS UTILITIES menu.

4.4 Sending Messages

Electronic mail, in the form of messages, is communicated on the RBBS by using the MAIL facility, and selecting either the "Enter a Message" procedure or the "Personal Mail" procedure. The Personal Mail procedure restricts the viewing of the message to the addressee. Messages sent using the Enter procedure can be viewed by any user. To determine the proper format of a user name, one can use the UTILITIES facility, User Log procedure. Appendix B.2 illustrates a sample dialogue for sending messages.

4.5 Receiving Messages

A caller can read, scan, or view topics of messages sent by other users. These utilities are available under the MAIL facility of the MAIN menu. Read messages allows the caller to display the full message on the remote workstation screen. Scan messages allows the caller to view a listing of information about a particular message or all messages. Information included in the list is: message number, date, sender, addressee and topic. Selecting the Topics procedure lists each message number and the topic. Selecting the Personal Mail procedure lists the mail sent explicitly to the caller and the personal mail left by the caller. Appendix B.2 illustrates a sample dialogue for each of the receive mail procedures.

4.6 Transferring Files

Communicating files using the RBBS is one of its most useful capabilities. It provides an easy method to send (upload from the user workstation) and receive (download from the RBBS to the user

workstation) files. Any file format identified in Section 2 can be communicated using the RBBS. Of course, consideration must be given to the volume of information which dictates the amount of time required to communicate the file. For the purpose of this document, only the Kermit file transfer will be described. It is considered to be the most universal and cost effective method.

4.6.1 Sending Files (Uploading)

Sending files from the caller's workstation to the RBBS is called uploading. The caller selects the ELSEWHERE facility from the MAIN menu, and then selects the Upload procedure from the FILES menu. This process stores the file on the RBBS disk and creates an entry in the Upload directory. The caller enters a name for the file to be uploaded. This name may be the same or different from the file stored on the workstation. If a file by the same name already exists on the RBBS, the caller is notified, and must choose another name for the new file. Once the name is entered, the caller is notified that the RBBS is ready to receive the file. The user must "escape" to local Kermit and enter commands to "send" the file (see Appendix C). Kermit will then monitor the progress of the file transfer and notify the caller when the file transmission is complete. The caller must then return to the RBBS by issuing the "connect" command. The caller will then be asked to record a short description of the file. This information is stored as an entry in the Upload directory and can be viewed by other RBBS users. Appendix B.3 illustrates a sample dialogue for uploading files.

4.6.2 Receiving Files (Downloading)

Transferring files from the RBBS to the caller's workstation is performed by selecting the ELSEWHERE facility. Download procedure from the FILES menu. The caller will normally be notified that a file has been stored on the RBBS by another user who has sent notification using the message facility. The user should specify the name of the file in the message so that the caller knows which one to select. To perform the download procedure, the caller must select the Download procedure and enter the name of the file. If the file is found in the Upload directory, the caller is notified of the approximate time needed to Download the file and that the RBBS is ready to send. The caller must then "escape" to local Kermit and enter the "receive" command (see Appendix C). The receive command also specifies the name of the file to be stored on the caller's workstation. Successful completion of the download operation will result in the display of the message "Download successful". The caller must then return to the RBBS by issuing the "connect" command, at which time the FILES menu will be displayed. Appendix B.4 illustrates a sample dialogue for downloading files.

4.6.3 Other FILES Menu Procedures

Several other procedures in the FILES menu are worthy of note in this section. These procedures are useful when there is a need to know the contents or date of transfer of a file.

The "New files" procedure allows the user to view the entries in the Upload directory that have been transferred since a specified date (MMDDYY). This is especially useful when the upload

directory is very large.

The "Search files" procedure allows the user to specify a string of characters to be used in searching the Upload directory file contents for occurrences of a string of characters. This is useful when the sender of a file did not specify the name of the file, but the caller knows the subject matter. Appendix B.5 illustrates a sample dialogue for the New Files and Search Files procedures.

4.7 Cement and Concrete Research Activities Database

Access to the Research Activities Database is accomplished by selecting the SYSTEM facility, Bulletins procedure from the RBBS MAIN menu. When the "B" command is entered, a list of bulletins or database topics is displayed on the callers screen. From this list, the caller can select the topic by entering its assigned numeric value. This will result in a screen display/s containing the information selected. The currently available topics are described in Section 2.3. When the caller is finished viewing the information, return to the RBBS MAIN menu is accomplished by depressing the enter key. Appendix B.6 illustrates the information currently available.

4.8 Using Computer Conferencing

There are only two commands that are necessary to use the Computer Conferencing procedure of the RBBS. The first command is to View the conferences that are operational. This is accomplished by typing "V" from the RBBS MAIN menu. This will display a list of conferences on the callers screen. The second command is to join the conference. If a caller has sufficient priority (that which is established by the SYSOP when the conference is formed), then he can join the conference. Joining a conference is accomplished by entering "J" from the RBBS MAIN menu and entering the name of the conference. Joining a conference then allows the caller to communicate with other members, since "joining" directs all communications (e.g. messages) between the conference members.

4.9 Trouble-Shooting

Solving computer problems is a difficult problem. One must first isolate the piece of equipment or computer program that is responsible. It is not impossible to identify all of the potential failures that could occur while using the RBBS computer. It is possible, however, through past experiences, to identify the most common failures, their probable source, and recommended remedial action. This information is listed in Appendix C. Further assistance can be obtained from the computer manuals specific to the user's workstation and the references contained in this document. As a last resort, the staff operating the RBBS can be of further assistance. If problems occur during RBBS use or there are improvements that can be made to this document to better describe the operating procedures, this information should be directed to the staff identified in the Introduction Section of this document.

5. SUMMARY

This document has described the capabilities and use of a computerized system for exchanging information. It is a simple and easy to use facility designed to "link" researchers involved in cement and concrete research, through the use of a computer and the commercial telephone network. The NIST RBBS gives researchers access to information about the cement and concrete research area which might otherwise go unnoticed. It is hoped that the interactions generated from the use of this facility will serve to promote ideas, collaborations and the dissemination of information, and improve communication.

6. REFERENCES

- [1] Kaetzel, L.J., Clifton, J.R., "A Bulletin Board System for Feedback to the DURCON Expert System: A Description and Reference", NISTIR 86-3332, NIST, Gaithersburg, MD (1986).
- [2] Gianone, C., da Cruz, F., Douppnik, J.R., "MS-DOS Kermit User Guide", Columbia University Center for Computing Activities, New York, NY (1988).
- [3] Mack, D.T., Martin, J., Goosens, K., "Remote Bulletin Board System for the IBM Personal Computer, Version CPC17.2A: Technical Reference Guide", D. Thomas Mack, Trumbull, CT (1989).

7. ACKNOWLEDGEMENT

The authors wish to thank Dr. Leslie Struble of the University of Illinois (formerly of NIST) for her comments, encouragement, and persistence in the use of resources relating to information exchange within the ACBM. These include the design, implementation, and evaluation of the infrastructure which is currently in operation.

8. GLOSSARY

ASCII (American Standard Code for Information Interchange) A coded system for representing computer stored characters, numeric values, and special symbols.

Baud The number of times per second the signal can change on a transmission. Commonly, the transmission line uses only two signal stages, making the baud rate equal to the number of bits per second that be transferred.

BPS (Bits Per Second) A measure of the rate of data transmission.

RS232 A standard by EIA that specifies the electrical characteristics of slow speed interconnections between terminals and computers or between two computers.

Bit A binary unit of information that can take the value of 1 or 0. This is the fundamental unit of digital communication.

Modem A device used to convert the digital signals used by computers or terminals into analog signals for transmission over conventional telephone equipment.

PBX (Private Branch Exchange) A telephone exchange used within an organization for switching its internal and external telephone traffic.

Terminal emulation A technique for communication between a personal computer and a host time-sharing computer.

RBBS (Remote Bulletin Board System) A computer system installed to allow callers to exchange ideas, messages, files, and to query the computer on topics of interest.

SYSOP (System Operator) The person designated to manage the RBBS.

Appendix A.1 Electronic Mail Message

- 1: Leslie:
- 2: I have uploaded the WordPerfect file named "acirpt.doc". When you
- 3: have completed editing this document, please re-transmit to me.
- 4: Larry

Appendix A.2 Electronic File Transfer

TRANSFERRING CMM FILES BETWEEN ACCOUNTS

A special 3C command procedure (css) has been created to allow the transfer of selected files between accounts and/or disks. This procedure can be run only from the 3C console. It uses a file named `usr1:cmmtxf.cmd/21`. It is expected that this file will be changed as needed by the account 21 owner. The important thing to remember is that whatever exists in that file will be backed up when the `cmmtxf.css` procedure is started. A listing of the `cmmtxf.css` procedure and the `cmmtxf.cmd/21` command file is attached.

Backup parameters required by the user are:

- parameter #1: input physical disk drive (t1: or t5: or t6:)
- parameter #2: output physical disk drive (t1: or t5: or t6:)
- parameter #3: account to which the files are to be transferred

These can be displayed by typing the command: `cmmtxf` with no parameters.

Default backup parameters are:

- `list=pr2:` (which generates a printed listing of the process)
- `skip` turned on (which skips files if they exist under the account being transferred to)
- `sel=usr1:cmmtxf.cmd/21` (which is the file containing the selected file names)

Appendix A.3 Cement and Concrete Research Activities Database - Scheduled Seminars
and Symposia

FIELD NAME	DATA TYPE	SIZE
speaker	character	65
topic	character	1-2 lines, 40 per line
date and time	character	40
location of meeting	character	65
sponsor	character	40

Appendix A.4 Cement and Concrete Research Activities Database-Archived
Models and Algorithms

FIELD NAME	DATA TYPE	SIZE
name of model	character	40
description	character	1-9 lines, 60 per line
version number	character	5
references	character	1-12 lines, 65 per line
contact person	character	1-2 lines, 65 per line

Appendix A.5 Cement and Concrete Research Activities Database-Project Summaries

FIELD NAME	DATA TYPE	SIZE
project name	character	1-12 lines, 65 per line
research area	character	65
description	character	1-12 lines, 65 per line per line
contact person	character	65

Appendix A.6 Cement and Concrete Research Activities Database-Selected
Cement and Concrete Publications

FIELD NAME	DATA TYPE	SIZE
author	character	65
title	character	1-2 lines, 65 per line
publisher	character	1-2 lines, 65 per line
publisher's location	character	65
reference	character	40
publication date	numeric (mm/yy)	8

Appendix B.1 Example logon session

WELCOME TO BLDG MATLS RBBS

* This bulletin board system is operational 24 hours per day. *
* You must establish your protocol as Kermit in order to *
* upload/download files. *

What is your FIRST name? larry
What is your LAST name? kaetzel

LARRY, welcome back!
Checking Users...
Enter Password (dots echo)?

Granted access level 9
Logging LARRY KAETZEL
RBBS-PC CPC17.2A NODE 1, OPERATING AT 1200 BAUD,N,8,1

Times on: 63 Last was: 10-03-90 11:28

Checking messages in MAIN.
Sorry, LARRY, NO MAIL for you

Mail you left
*2
Please Kill old/unneeded msgs

RBBS-PC CPC17.2A Node 1

Caller # 69 # active msgs: 2 Next msg # 4 Last msg read: 2

USERS: used 10 avl 51 MSGS: used 2 avl 18 MSG REC: used 9 avl op n
Upload disk has 24952832 bytes free
59 min left

Press Any Key to continue

RBBS-PC M A I N M E N U

----- MAIL ----- SYSTEM ----- UTILITIES ----- ELSEWHERE -
[E]nter a Message [A]nswer Questions [H]elp (or ?) [D]oors
[K]ill a Message [B]ulletins [*]oin Conferences [F]iles
[P]ersonal Mail [C]omment [V]iew Conferences [G]oodbye
[R]ead Messages [I]nitial Welcome [X]pert on/off [Q]uit
[S]can Messages [O]perator Page [U]tilities
[T]opic of Msgs [W]ho else is on * = unavailable [*]Library

MAIN command <?,A,B,C,D,E,F,H,I,K,O,P,Q,R,S,T,U,V,W,X>?

Appendix B.2 Example session for messages.

Scanning Messages:

```

                RBBS-PC  M A I N  M E N U
----- MAIL ----- SYSTEM ----- UTILITIES ----- ELSEWHERE --
[E]nter a Message [A]nswer Questions [H]elp (or ?)      [D]oors
[K]ill a Message  [B]ulletins          [*]oin Conferences [F]iles
[P]ersonal Mail   [C]omment            [V]iew Conferences [G]oodbye
[R]ead Messages   [I]nitial Welcome    [X]pert on/off     [Q]uit
[S]can Messages   [O]perator Page       [U]tilities
[T]opic of Msgs   [W]ho else is on      * = unavailable  [*]Library

MAIN command <?,A,B,C,D,E,F,H,I,K,O,P,Q,R,S,T,U,V,W,X>? s
Message base MAIN
Msg # 2-3 (H)elp,(S)ince,(L)ast, (T)o,(F)rom,(M)ine, text, [Q]uit)? 1
*3      05-17 GARLAND STEELE      -> PETE SPELLERBERG      AMRL GUIDE
*2      05-02 LARRY KAETZEL       -> PETE SPELLERBERG      WELCOME

End Msgs
```

Viewing topics:

```

                RBBS-PC  M A I N  M E N U
----- MAIL ----- SYSTEM ----- UTILITIES ----- ELSEWHERE --
[E]nter a Message [A]nswer Questions [H]elp (or ?)      [D]oors
[K]ill a Message  [B]ulletins          [*]oin Conferences [F]iles
[P]ersonal Mail   [C]omment            [V]iew Conferences [G]oodbye
[R]ead Messages   [I]nitial Welcome    [X]pert on/off     [Q]uit
[S]can Messages   [O]perator Page       [U]tilities
[T]opic of Msgs   [W]ho else is on      * = unavailable  [*]Library

MAIN command <?,A,B,C,D,E,F,H,I,K,O,P,Q,R,S,T,U,V,W,X>? t
Msg # 2-3 (H)elp,(S)ince,(L)ast, (T)o,(F)rom,(M)ine, text, [Q]uit)? 2

*2      WELCOME                  *3      AMRL GUIDE

End Msgs
```

Appendix B.2 Example session for messages.

Reading (receiving) messages:

```

                                RBBS-PC  M A I N  M E N U
----- MAIL ----- SYSTEM ----- UTILITIES ----- ELSEWHERE --
[E]nter a Message [A]nswer Questions [H]elp (or ?)      [D]oors
[K]ill a Message  [B]ulletins          [*]oin Conferences [F]iles
[P]ersonal Mail   [C]omment            [V]iew Conferences [G]oodbye
[R]ead Messages   [I]nitial Welcome    [X]pert on/off      [Q]uit
[S]can Messages   [O]perator Page       [U]tilities
[T]opic of Msgs   [W]ho else is on      * = unavailable  [*]Library

MAIN command <?,A,B,C,D,E,F,H,I,K,O,P,Q,R,S,T,U,V,W,X>? r
Message base MAIN
Msg # 2-3 (H)elp,(S)ince,(L)ast, (T)o,(F)rom,(M)ine, text, [Q]uit)? 2

Msg #: *2
From:  LARRY KAETZEL                Sent: 05-02-90 07:45
To:    PETE SPELLERBERG             Rcvd: 05-02-90 08:03
Re:    WELCOME

Pete:
The bulletin board seems to be working fine now. I am preparing
a diskette for you to use the newer version of Kermit 2.31
this morning.

More [Y]es,(N)o,(C)ontinuous,(A)bort,(R)eply,(T)hread,(=)reread,+,-,(K)ill? y
Msg # -3 (H)elp,(S)ince,(L)ast, (T)o,(F)rom,(M)ine, text, [Q]uit)? q
```

Appendix B.2 Example session for messages.

Sending messages:

```

                                RBBS-PC  M A I N  M E N U
----- MAIL ----- SYSTEM ----- UTILITIES ----- ELSEWHERE --
[E]nter a Message [A]nswer Questions [H]elp (or ?)      [D]oors
[K]ill a Message  [B]ulletins          [*]oin Conferences [F]iles
[P]ersonal Mail   [C]omment             [V]iew Conferences [G]oodbye
[R]ead Messages   [I]nitial Welcome     [X]pert on/off      [Q]uit
[S]can Messages   [O]perator Page        [U]tilities
[T]opic of Msgs   [W]ho else is on      * = unavailable  [*]Library

MAIN command <?,A,B,C,D,E,F,H,I,K,O,P,Q,R,S,T,U,V,W,X>? e

To [A]ll,S)ysop, or name? Leslie Struble
Subject (Press [ENTER] to quit)? Transmission of file
Make message p[U]blic, p(R)ivate, (P)assword protected, (H)elp? r
Sending personal mail to LESLIE STRUBLE

Type message 19 lines max (Press [ENTER] to quit)

[-----]
1: Leslie:
2: I have uploaded the WordPerfect file named "acirpt.doc".  When you
3: have completed editing this document, please re-transmit
  to me.
4:

A)bort,C)ont,D)el,E)dit,I)nsert,L)ist,M)argin,R)ev subj,S)ave

Edit Sub-function <A,C,D,E,I,L,M,R,S,?>? s
Adding new msg # 4.
Receiver will be notified of new mail
```

Appendix B.3 Example session for uploading files.

```

      RBBS-PC   F I L E   S Y S T E M
-- TRANSFER ----- INFORMATION --- UTILITIES --- ELSEWHERE -
[D]ownload file   [L]ist files   [H]elp (or ?)   [G]oodbye
[P]ersonal dwnld  [N]ew files    [X]pert on/off  [Q]uit
[U]pload file     [S]earch files
  * = unavailable  [V]erbose list

FILE command <?,D,G,H,L,N,P,Q,S,U,V,X>? u
Upload what file(s)? mail.ses
Searching for MAIL.SES.
Upload disk has 24965120 bytes free
Protocol          : Kermit
Ready to receive  MAIL.SES

Upload successful
Describe MAIL.SES (Begin with '/' if for SYSOP only)
|-----+---Min<..+---2+0---+---3+0---..Max>
? Testing file for communications publication
Add an EXTENDED DESCRIPTION of MAIL.SES ([Y],N)? n
```

Appendix B.4 Example session for downloading files.

```

          RBBS-PC   F I L E   S Y S T E M
-- TRANSFER ----- INFORMATION --- UTILITIES --- ELSEWHERE -
[D]ownload file   [L]ist files   [H]elp (or ?)   [G]oodbye
[P]ersonal dwnld  [N]ew files    [X]pert on/off  [Q]uit
[U]pload file     [S]earch files
  * = unavailable  [V]erbose list

FILE command <?,D,G,H,L,N,P,Q,S,U,V,X>? d
Download what file(s)? tecmtg
Searching for TECMTG.

File Size       : 19 blocks  2405 bytes
Transfer Time: 0 min, 25 sec (approx)
Protocol        : Kermit
Ready to send   tecmtg

Download successful
```

Appendix B.5 Example session for New files and Search files procedures.

New files:

```
RBBS-PC  F I L E  S Y S T E M
-- TRANSFER ----- INFORMATION --- UTILITIES --- ELSEWHERE -
[D]ownload file  [L]ist files  [H]elp (or ?)  [G]oodbye
[P]ersonal dwnld [N]ew files  [X]pert on/off  [Q]uit
[U]pload file    [S]earch files
* = unavailable  [V]erbose list

FILE command <?,D,G,H,L,N,P,Q,S,U,V,X>? n
Files on/after (MMDDYY, [ENTER] = last on 082990)? 090190
What directory(s) (U)pload,A)ll,L)ist,E)xtended +/-, [Q]uit)? u
Scanning Directory 99 for 900901
MAIL.SES 6668 09-26-90 Test file for communications publication
End list. R)elist, [Q]uit, or download what? q
```

Search files:

```
RBBS-PC  F I L E  S Y S T E M
-- TRANSFER ----- INFORMATION --- UTILITIES --- ELSEWHERE -
[D]ownload file  [L]ist files  [H]elp (or ?)  [G]oodbye
[P]ersonal dwnld [N]ew files  [X]pert on/off  [Q]uit
[U]pload file    [S]earch files
* = unavailable  [V]erbose list

FILE command <?,D,G,H,L,N,P,Q,S,U,V,X>? s
Search for (in file name/desc, wildcards name only, [ENTER] quits)?
Bernie
What directory(s) (U)pload,A)ll,L)ist,E)xtended +/-, [Q]uit)? u
Scanning Directory 99 for BERNIE
TECMTG      2405 08-28-90 Meeting with Bernie
End list. R)elist, [Q]uit, or download what? q
```



```

                                RBBS-PC  M A I N  M E N U
----- MAIL ----- SYSTEM ----- UTILITIES ----- ELSEWHERE --
[E]nter a Message [A]nswer Questions [H]elp (or ?) [D]oors
[K]ill a Message [B]ulletins [*]oin Conferences [F]iles
[P]ersonal Mail [C]omment [V]iew Conferences [G]oodbye
[R]ead Messages [I]nitial Welcome [X]pert on/off [Q]uit
[S]can Messages [O]perator Page [U]tilities
[T]opic of Msgs [W]ho else is on * = unavailable [*]Library

MAIN command <?,A,B,C,D,E,F,H,I,K,O,P,Q,R,S,T,U,V,W,X>? b
* Ctrl-K(^K) / ^X aborts. ^S suspends ^Q resumes *
===== [ Topics available include ] =====
  1 - Scheduled Seminars and Symposia
  2 - Building Materials Division Publications
  3 - Abstracts on Research in Progress
  4 - Cementitious Modeling Laboratory Models
Read what bulletin(s), L)ist, N)ew ([ENTER] = none)? 4
* Ctrl-K(^K) / ^X aborts. ^S suspends ^Q resumes *
July 17, 1989
*** Cementitious Modeling Laboratory Models ***

MODEL NAME      Cement Microstructure Model
DESCRIPTION      A computer model to simulate the development of
                  microstructure during the hydration of cement.
                  The model is used to examine the effects of particle
                  size distributions on packing of the particles and
                  on microstructural development during cement
                  hydration. The simulation demonstrates graphically
                  the effects on microstructure of typical particle
                  size distributions reported using an open-circuit
                  ball mill and roller mill.

VERSION 8
REFERENCE/S      Proceed. of the Engineering Foundation Conference (1986),
                  CIB.86 Advancing Building Technology Proceedings (1986),
                  Journal of American Ceramic Society 69(11)790-795 (1986),
                  Matls. Res. Society Symposia Proceedings, 85 (1987),
                  Manual for Cement Hydration Simulation Model, NIST (1989)
                  8th Intl Congress on the Chemistry of Cement,
                  2 310-315(1986),
                  World Cement, 16(8) 326-333,
                  World Cement, 15(1),13-24,
                  Proceed. of Seminar on Hydration of Cement,
                  Copenhagen (1987),
                  Zement Kalk Gips 35(8), 425-431 (1982).

CONTACT/S        J.R. Clifton (NIST), L.J. Kaetzel (NIST), L.J. Struble
                  (Univ. of Illinois).

* Ctrl-K(^K) / ^X aborts. ^S suspends ^Q resumes *
===== [ Topics available include ] =====
  1 - Scheduled Seminars and Symposia
  2 - Building Materials Division Publications
  3 - Abstracts on Research in Progress
  4 - Cementitious Modeling Laboratory Models
  5 - Currently not in use.
  6 - Currently not in use.
Read what bulletin(s), L)ist, N)ew ([ENTER] = none)?

```


Appendix C. The Most Common RBBS Failures and their probable source.

RBBS DOES NOT ANSWER RBBS computer or its phone line is not working. Call the system operator.

RBBS ANSWERS BUSY Someone is currently using the RBBS computer. Try again later.

WORKSTATION DISPLAY NON-READABLE INFORMATION Either the speed of the workstation is set incorrectly, the workstation is not working, or the communications line is malfunctioning. Check Kermit's settings (Stat command) and make sure that the settings are the same as noted in Table 6.

FILE TRANSFER DOES NOT WORK Make sure the user configuration is set correct (as noted in 4.3).

RBBS WILL NOT RECOGNIZE COMMANDS Make sure the command is valid (use the RBBS HELP facility). If this fails, contact the SYSOP or Restart the workstation and dial the RBBS again.

RBBS STOPS ACCEPTING COMMANDS Restart the workstation and dial RBBS again.

WORKSTATION WILL NOT DIAL RBBS COMPUTER Check to make sure the workstation cables are connected, the communications program is configured properly, and that the workstation communications port is assigned correctly.

RBBS CAN NOT FIND FILE FOR DOWNLOADING Use the FILES facility to list the catalog of files RBBS has in its directory.

NOT ENOUGH SPACE ON THE RBBS COMPUTER DISK TO UPLOAD A FILE Call the SYSOP immediately. The RBBS computer's disk is full.

WORKSTATION ESCAPE OR CONTROL CHARACTERS DO NOT WORK Either the workstation keyboard is broken, the communications line is malfunctioning, or Kermit has not been taught to understand the key strokes. Make sure the key you are depressing is valid for the command, and that the communications line is working, and that Kermit knows what the escape or control is (refer to the Kermit User Guide [2]).

Appendix D. Summary of Kermit operating commands.

This table of the Kermit communications program commands is provided for new and infrequent users. A detailed description may be found in the MS-DOS Kermit User Guide Published by the Columbia University Center for Computing Activities, New York, NY 10027.

COMMAND	ACTION
Connect	Directs input and display for the user's workstation to the host computer.
Set Speed	Sets the speed of transmission for the Kermit Session.
Echo	Turns the display of lines on the screen on and off.
Receive	Commands Kermit to receive a file from the host computer.
Send	Commands Kermit to transmit a file to the host computer.
Quit	Terminates the Kermit session.
Hangup	Sends a signal to the modem to turn off the connection.
Stat	Displays the current Kermit session configuration.
Local Kermit	Depressing the keys Ctrl-} and C while in the "host mode" will allow the operator to enter local commands (e.g. quit).
Host Mode	Enter the "connect" command while in local Kermit mode will allow the operator to interact with the host computer.
Set Parity	Sets the parity required by the host computer.
Log Session	Records the information displayed on the workstation screen to a file.
Close Session	Terminates the recording of information (log) to a file.

Appendix D. Summary of Kermit operating commands.

COMMAND	ACTION
Directory	Displays a directory of local files.
Take	Accepts Kermit commands from a local file.
Version	Displays the currently running version of Kermit.

Appendix D. Summary of Kermit operating commands.

Example of Kermit command initialization file:

```
; MSKERMIT.INI
;
; MS-DOS Kermit 2.31 initialization file
;
; Larry Kaetzel
; January 3, 1990
;
define msmfvm set key clear,take msmfvm.kbd,take msmfvm.scr
define cmeamrf set key clear,take cmeamrf.kbd,take cmeamrf.scr
;
set baud 1200
set parity space
set local-echo off
set flow-control xon/xoff
set terminal wrap on
set incomplete keep
set handshake none
set mode-line off
set warning on
set timer on
set eof noctrl-z
set terminal color 0 10 37 44
```


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<h2 style="margin: 0;">BIBLIOGRAPHIC DATA SHEET</h2>		1. PUBLICATION OR REPORT NUMBER <div style="text-align: center; margin-top: 5px;">NISTIR 4473</div>	
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5. AUTHOR(S) <div style="text-align: center; margin-top: 10px;">Lawrence J. Kaetzel and James R. Clifton</div>			
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9. SPONSORING ORGANIZATION NAME AND COMPLETE ADDRESS (STREET, CITY, STATE, ZIP)			
10. SUPPLEMENTARY NOTES			
11. ABSTRACT (A 200-WORD OR LESS FACTUAL SUMMARY OF MOST SIGNIFICANT INFORMATION. IF DOCUMENT INCLUDES A SIGNIFICANT BIBLIOGRAPHY OR LITERATURE SURVEY, MENTION IT HERE.) <div style="margin-top: 20px;"> <p>A computer system has been installed at the National Institute of Standards and Technology, Building Materials Division, for exchanging and disseminating information related to cement and concrete research. The computer is accessible, remotely, through telephone lines. Messages, and computer stored files in many formats can be exchanged among cement researchers. Also, information can be retrieved and/or viewed that describes: scheduled symposia, archived computer based models, project summaries, and published papers. This document describes how to use the computer system.</p> </div>			
12. KEY WORDS (6 TO 12 ENTRIES; ALPHABETICAL ORDER; CAPITALIZE ONLY PROPER NAMES; AND SEPARATE KEY WORDS BY SEMICOLONS) <div style="margin-top: 10px; text-align: center;">cement and concrete research; information exchange; remote bulletin board computer</div>			
13. AVAILABILITY <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px;"> <input checked="" type="checkbox"/> UNLIMITED <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> </div> <div> FOR OFFICIAL DISTRIBUTION. DO NOT RELEASE TO NATIONAL TECHNICAL INFORMATION SERVICE (NTIS). ORDER FROM SUPERINTENDENT OF DOCUMENTS, U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, DC 20402. ORDER FROM NATIONAL TECHNICAL INFORMATION SERVICE (NTIS), SPRINGFIELD, VA 22161. </div> </div>		14. NUMBER OF PRINTED PAGES <div style="text-align: center; margin-top: 5px;">43</div>	
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ELECTRONIC FORM

